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CENTRAL INTELLIGENCE AGENCY

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50X1-HUM

COUNTRY USSR (Moscow Oblast)

REPORT

SUBJECT Aircraft Engine Plant No. 45 at Moscow;

DATE DISTR.

28 April 1960

NO. PAGES

1

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REFERENCES

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two reports on Aircraft Engine Plant No. 45 at Moscow:

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- a. The Construction of Large Metal Tanks at Plant No. 45, four pages. The tanks were ten m long and one to one and one-half meters in diameter. The interior of each tank contained some discs probably welded to a pipe which passed through the tank.

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- b. Shop No. 12 at Aircraft Engine Plant No. 45, 14 pages with sketches. The report describes the work of the combustion chamber shop and personalities there.

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CONSTRUCTION OF LARGE METAL TANKS AT PLANT 45

1. [redacted] at Aircraft Plant 45 [redacted] 50X1-HUM
[redacted] a shop [redacted] was engaged in the fabrication of a large metal tank. This shop was located in the same building as Shop No. 12 [redacted] and was an enclosed area which was previously used as a temporary holding or storage point for the units prepared in Shop No. 12 while waiting shipment to the plant central warehouse (Ts S G D - tsentralnyy sklad gotovykh detalov).

2. In January 1954 or 1955, this area was converted into the tank shop [redacted] 50X1-HUM
[redacted] Although it was an enclosed area, it was not a secret shop [redacted]

Preparation of Metal Tanks

3. These tanks [redacted] were 10 meters long and one to one and one-half meters in diameter. [redacted] these tanks 50X1-HUM were made of either stainless steel or a high grade aluminum alloy. The metal for the tanks was received at the plant from the Serp i Molot Steel Plant in Moscow or from an unknown steel plant in the vicinity of the Azov Sea, or both. [redacted] one or both of these plants supplied most 50X1-HUM the metal requirements for the plant. Full identification of the Azov 50X1-HUM plant was not available. The metal was received in sheets [redacted] 50X1-HUM roughly estimated to be five meters long, two-three meters wide and four millimeters thick.
4. [redacted] the tank 50X1-HUM was made up of about four or five sections welded together. The interior 50X1-HUM of the tank contained an unknown number of discs which fitted snugly inside the tank. These discs were made of the same material as the tank. The disc faces were perforated by an unknown number of holes distributed around a central hole. [redacted] these discs were 50X1-HUM not secured to the walls of the tank but were set at prescribed intervals and probably welded to a pipe which passed through the center of the tank. This was a steel pipe approximately 30 millimeters in inside diameter and 36 millimeters in outside diameter. [redacted] 50X1-HUM it was made from a good quality of steel. At the midway point of the length of pipe there was a large bend. The pipe protruded about 100 millimeters from both ends of the tank, and both ends of the pipe were threaded. Both end pieces of the tank were curved convexly and were solid except for the hole through which the pipe passed. The end pieces were welded into place, and no other holes or fittings for filling or emptying the tank were observed. 50X1-HUM

[redacted] possibly appropriate provisions were made later elsewhere. (Refer to page 4 [redacted] sketch of metal tank.)

5. In the process of construction of the tank, [redacted] the sheet material was subjected to one rolling operation, fed by hand, to obtain the desired shape. The rolled form section was then placed on a simple steel

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table which acted as a welding jig. This table-jig was about 700-800 millimeters high, and had a top consisting of rollers and four curved sections of channel steel, two on each side, securely welded to it between which the rolled section was placed. The abutting edges of the sections were clamped together and then electro-argon welded lengthwise with the use of a powdery flux. Beneath the table was a metal container to collect the excess flux. As the sections were welded, they were rolled out of the jig and lifted off the table by one man and placed on the floor. When the required number of sections were prepared in this manner, they were placed together on a similar type table-jig and welded together by the same method. The pipe with the discs was inserted and the ends of the tank were then electro-argon welded. The tank was then lifted by crane onto a flatbed carrier drawn by an electro-car and the unit was taken to the paint shop where [] it was painted black or dark green. From there, the tank was presumably shipped to an unknown destination by an unknown means of transportation. []

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6. [] the sheet material was X-rayed before it was rolled. Then after each welding operation, the individual sections were X-rayed, namely, the weld seams. This was supposedly repeated when the tank was completely assembled.

7. [] the shop contained two main assembly stations, four sub-assembly areas and [] six to eight tanks were made in the shop during an eight hour shift. [] the shop worked two shifts only, and [] the discs were prepared in the shop but [] the basic work on the pipe was done in another unknown shop.

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8. The shop was about the same size in area dimension as Shop No. 12 (approximately 50 x 40 meters) and it contained one 2.5 ton full, traverse, floor operated, overhead crane; at least four electro-argon welding machines; an X-ray station; and one or two large lathes. [] no []

[] uniformed military personnel in the shop []

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Use of the Unidentified Tanks

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9. [] these tanks []
[]
[] might have been fuel tanks for guided missiles. []

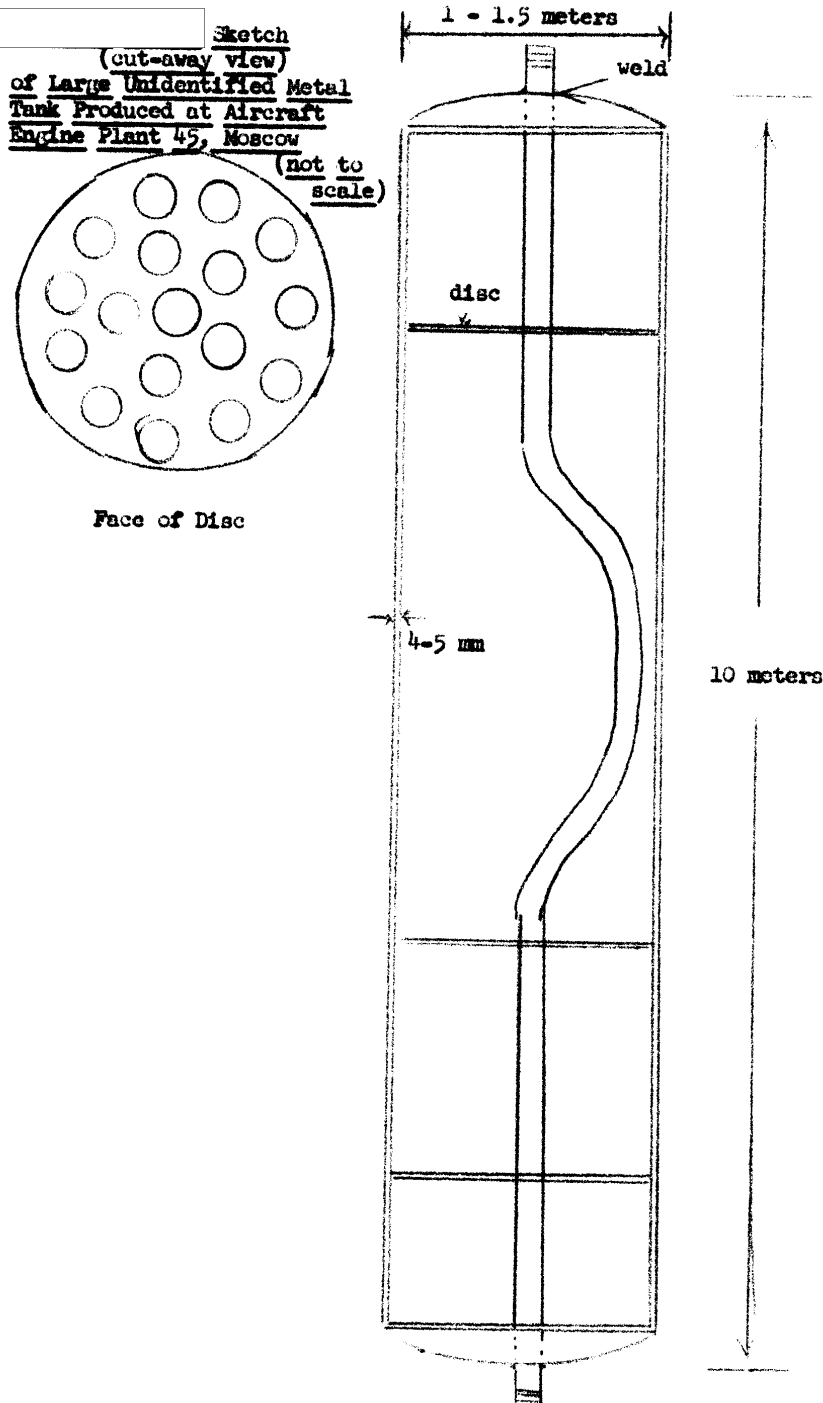
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SHOP NO.12, AIRCRAFT ENGINE PLANT NO. 45

General

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1. [redacted] subordination of the plant to the Ministry of Aviation Industries (MAP) [redacted] the plant director and chief plant engineer as Komerov (fnu) and Kuinze (fnu) respectively. The former had an honorary rank of General-Major in the Soviet Air Force.

2. [redacted] the plant produced the RD-45 and VK-1 jet aircraft engines. [redacted] the change-over from the RD-45 to the VK-1 engine production occurred in 1950 or 1951 [redacted]

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Shop No. 12

3. [redacted] Shop No. 12, the combustion chamber shop referred to as tsekh kozhukhov. This was the shop wherein the combustion chambers or cans for the centrifugal and axial flow engines and a few of their directly related components were fabricated.

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4. Shop No. 12 was about 50 x 40 meters in area dimension and divided into four main work groups, e.g. the connecting pipe group (grupa patrubkov), the combustion chamber casing group (grupa kozhukhov), the combustion chamber group (grupa sharovaya truba), and the screen and throat group (grupa setek i gorlovinki).

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Basically, the shop worked three shifts, from 0800 to 1700 hours, 1700 to 0030 hours and 0030 to 0800 hours, however, the labor force was smaller in size during the second and third shifts. Overall, the direct labor employed in the shop was in the vicinity of 170 and the indirect labor, around 30.

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Connecting Pipe Group

5. The connecting pipe group was identified as the first group. This group employed approximately 50 workers in a ratio of about 35, 10 and 5 per first, second and third shifts respectively. [redacted] 50X1-HUM

[redacted] in general they prepared the connecting pipes associated and related to the combustion chambers. These connecting pipes were made of an unknown type of aluminum alloy estimated to be about two to three millimeters thick. The material for these pipes was prepared in Shop No. 17 where the pipe was cut to approximate size and then stamped (pressed) to shape. The shaped material was then sent to this group where it underwent the final work processes. This included the preparation of the pipe for soldering, i.e. beveling the edges to be soldered, soldering by the use of an electric oven and a brass (latun) solder composed of zinc and copper, polishing and grinding, and anodizing. The items underwent the usual pre-stage inspections performed by regular shop inspectors as opposed to military inspectors. [redacted] 50X1-HUM

[redacted] no [redacted] inspection marks or stamps were used during the intermediate work phases but when completed, an unknown inspection mark was etched on an unknown part of the pipe with an acid solution. When the item was completed, it was sent to the central warehouse (Ts S G D - tsentralnyy sklad gotovykh detalov) rather than to another shop for immediate use. From this warehouse, the parts were sent to the engine assembly shop or to another pre-assembly shop as required. 50X1-HUM

Combustion Chamber Casing Group

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6. [redacted] the combustion chamber casing group [redacted] was identified as the second group. This group worked three shifts and employed the following type workers per shift as indicated:

<u>Employees</u>	<u>First</u>	<u>Second</u>	<u>Third</u>	<u>Shifts</u>
senior shop foreman	1	-	-	
group foreman	1	1	1	
section chiefs	2	2	2	
senior inspector	1	-	-	
seven inspectors	3	3	1	
group work planner	1	-	-	
group norm supervisor (normirovshchik)	1	-	-	
group technologist	1	-	-	
dispatcher	1	1	1	
hydraulic tester	1	1	1	
assemblers	4	4	-	
oven workers	3	3	3	
electric welder	1	1	1	
chippers	1	1	1	
lathe operators	3	3	3	
drill operators	2	2	2	
electricians	2	2	2	
air compressor operators	1	1	1	

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7. The casing unit for the combustion chamber was made in its entirety in this group. It was made of an unknown high grade steel alloy received at the plant from the Serp i Molot Steel Plant in Moscow. The shop received the steel in sheet form about two meters square and one and one-half to two millimeters thick.
8. The combustion units were layed out in the shop and by use of a pattern were then cut out. The edges to be soldered were beveled and then the cut-out material was subjected to a cold welding operation to obtain the desired form. Only one rolling operation was necessary. The unit was spot-welded in two or three places and then the entire seam was soldered with the brass solder mentioned above. This soldering operation was performed in a special electric oven designed and built at the plant in Shop No. 12 specifically for this phase of work. This was a large oven approximately 10-12 meters long which stood about a meter and a half high and was about a meter wide. (Refer to page 10 [redacted] sketch of the oven.) The inside of the oven contained a conveyor belt on which the casing units were placed and moved from one end of the oven to the other. At the removing end of the oven there was a cooling chamber in which the casing units were sprayed with water.
9. In soldering the seam of the housing unit, a length of the brass solder wire was placed in the previously prepared beveled groove. The unit was then placed upright on the conveyor in the oven and the heat therein fused the solder to the steel unit. The unit was in the oven for about 10 minutes and the operating temperature was about 950 degrees centigrade. The oven was constructed in such a manner that when the outer door of the cooling chamber was opened, a door slid down and closed off the oven from the cooling chamber to prevent any loss of heat. The cooling process was about five minutes long and upon completion, the casing unit was withdrawn and set aside. Ultimately, the unit was cleaned, (flakes were chipped off) and then it was fitted with angle iron flanges on the upper and lower portions. These flanges, previously rolled into shape in the flange shop, had an unknown number of bolt holes drilled through one lip of the flange. The drilling operation was performed by this work group. The flange was then fitted around the outside circumference of the housing unit and electrically welded. Both ends of the housing unit were secured for testing purposes only, and the unit was submerged in water and subjected to a hydraulic pressure test at four atmospheres. Upon successful completion of this test, the unit was dried, inspected and then sent to an unknown shop to be painted (presumably green). From the paint shop, the unit was sent to the central warehouse (Ts S G D) to be used as required.
10. [redacted] no soldering paste or flux was used during the oven soldering process and [redacted] the soldering wire was just fitted into the prepared groove. [redacted] this soldering process was preferred over welding because the result was a smoother, more even, and a more seal-proof seam than that achieved by welding. 50X1-HUM
11. [redacted] these units only underwent regular shop BIAK inspections and did not undergo any military inspections. 50X1-HUM

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12. The BFAK inspection mark was stamped on the upper side of the lower flange and merely consisted of a small rhomboid figure with a number identifying the inspector. The only other mark that appeared on the unit was the symbol K-103-101 also stamped on the upper side of the lower flange. The letter K and the number 103 were constant and referred to the unit - K signifying Kozhukh and 103, the part number. The last digit in the number 101 changed and proceeded consecutively from one to nine i.e. 101, 102, 103, etc. which corresponded to the nine combustion chambers produced per engine. No other changes or markings were evidenced or used.
13. As previously stated, the casing unit was made of steel about 1.5 to 2 millimeters thick and was about 600-700 millimeters tall, 350-400 millimeters in diameter at the base and 200 millimeters in diameter at the top. (Refer to figure 1, page 11 sketch of the casing unit.) 180 casing units were completed during a two-shift period. (These units were not assembled during the third shift although all other work was performed.) the overall cost per unit - labor and material - was about 100 rubles.
- Combustion Chamber Group
14. The combustion chamber group was identified as the third group. Although this group worked three shifts, the number of workers on the third shift was small. The labor force of this group was comparable to that of the second group.
15. This group prepared the combustion chamber units which were also made of an unknown type of high quality steel alloy. the steel sheets were cut-out and pressed to shape in Shop No. 17 and then sent to this group in Shop No. 12.
16. the combustion chamber was made up of four separate sections. (See figure 2, page 11 sketch of the combustion chamber.) the overall height of the combustion chamber was about 100 millimeters taller than the housing unit thereby making the chamber about 700-800 millimeters in height. It was about 180 millimeters in diameter at its widest point on one end remaining constant to mid-way point then tapering down to about 150 millimeters to the conical top which was about 50 millimeters in diameter. These were all outside diameters and the material was again about 1.5 to 2 millimeters thick throughout.
17. The sections necessary to make up the combustion chamber unit were electrically welded together and at the base of the chamber a steel ring was welded. The specifications were unknown but approximately 10 to 12 flat, thin, tapering steel blades about 30 millimeters long were welded to this ring. The other specifications or the purpose of these blades were unknown. In this assembled form then the combustion chamber unit was tempered in electric ovens at approximately 900 degrees

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to 1000 degrees centigrade. The units remained in the ovens for at least an hour and one-half, and then, after cooling, were cleaned and highly polished. The unit was then inspected and sent to the central warehouse (Ts S G D). The type of inspection mark placed on the chamber was unknown.

Screen and Throat Group

18. [redacted] this group 50X1-HUM
[redacted] was the fourth group and [redacted] it prepared the screens and throat sections used in conjunction with the chamber. The screens (specifications unknown) were made of stainless steel. This group worked two shifts employing a total of about 40 workers at a 30 - 10, first to second shift ratio.

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Personalities

19.

[redacted]

20. Diatlov (fnu). He was a Russian and chief of Shop No. 12. [redacted]

[redacted]

21. Vasiliy Vasilyevich Bervazov. He was the senior foreman of the second (combustion chamber casing) group. [redacted]

[redacted]

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Abbreviated Plant Layout

22. Refer to page 12 , an abbreviated layout of the northeast corner of Aircraft Plant 45 primarily depicting the location of Shop No. 12.

- Point 1. Meyerovskiy proyezd.
- Point 2. Wooden fence
- Point 3. Southern employee entrance.
- Point 4. Vehicular entrance
- Point 5. Timekeeper's office.
- Point 6. Security office.
- Point 7. Shop No. 17, press and die shop.
- Point 8. Flange shop.
- Point 9. Plant building.
- Point 10. Shop No. 12.
- Point 11. Shop No. 16.
- Point 12. Shop where possible fuel tanks were made.
- Point 13. Shop No. 23.
- Point 14. Shop No. 19.
- Point 15. Single track rail line servicing plant.
- Point 16. Plant building.

Layout of Shop No. 12, Ground Floor

23. (Refer to page 13 sketch.)

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- Point 1. Stairway to shop offices on balcony.
- Point 2. Corridor through shop.
- Point 3. Entrance to shop.
- Point 4. Shop mechanics workshop.
- Point 5. Grinding and polishing machines.

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- Point 6. X-ray room.
- Point 7. Gas storage room.
- Point 8. First group - connecting pipe group.
- Point 9. Electric oven.
- Point 10. Area for group inspectors.
- Point 11. Shop mechanic's workshop.
- Point 12. Supply room.
- Point 13. Second group - the casing group
- Point 14. Hydraulic test area.
- Point 15. Welding machines.
- Point 16. Layout work area.
- Point 17. Electric oven (Refer to page 10 , for sketch of oven.)
- Point 18. Group assembly area.
- Point 19. Lathe machines.
- Point 20. Area for group inspectors.
- Point 21. Tool room.
- Point 22. Blueprint storage room.
- Point 23. Third group - the combustion chamber group.
- Point 24. Lathe machines.
- Point 25. Area for group inspectors.
- Point 26. Layout work area.
- Point 27. Electric oven.
- Point 28. Welding machines and welding area.
- Point 29. Dispatcher's office.
- Point 30. Electrical section for shop.
- Point 31. Fourth group - throat and screen group.
- Point 32. Welding machines and welding area.

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Point 33. Supply room.

Point 34. Area for group inspectors.

Point 35. Wide entrance to shop.

Layout of Shop Offices on Balcony

24. (Refer to page 14 sketch.)

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Point 1. Technical office.

Point 2. Shop chief's office.

Point 3. Office of the shop chief's secretary.

Point 4. Bookkeeping and accounting office.

Point 5. Krasnyy ugolok.

Point 6. Shop Party representative.

Point 7. Chief inspector.

Point 8. Chief mechanic.

Point 9. Women's lavatory.

Point 10. Men's lavatory.

Point 11. Stairway.

Point 12. Corridor.

Point 13. Hot water tanks and showers.

Point 14. Locker room.

Point 15. Shop welfare office.

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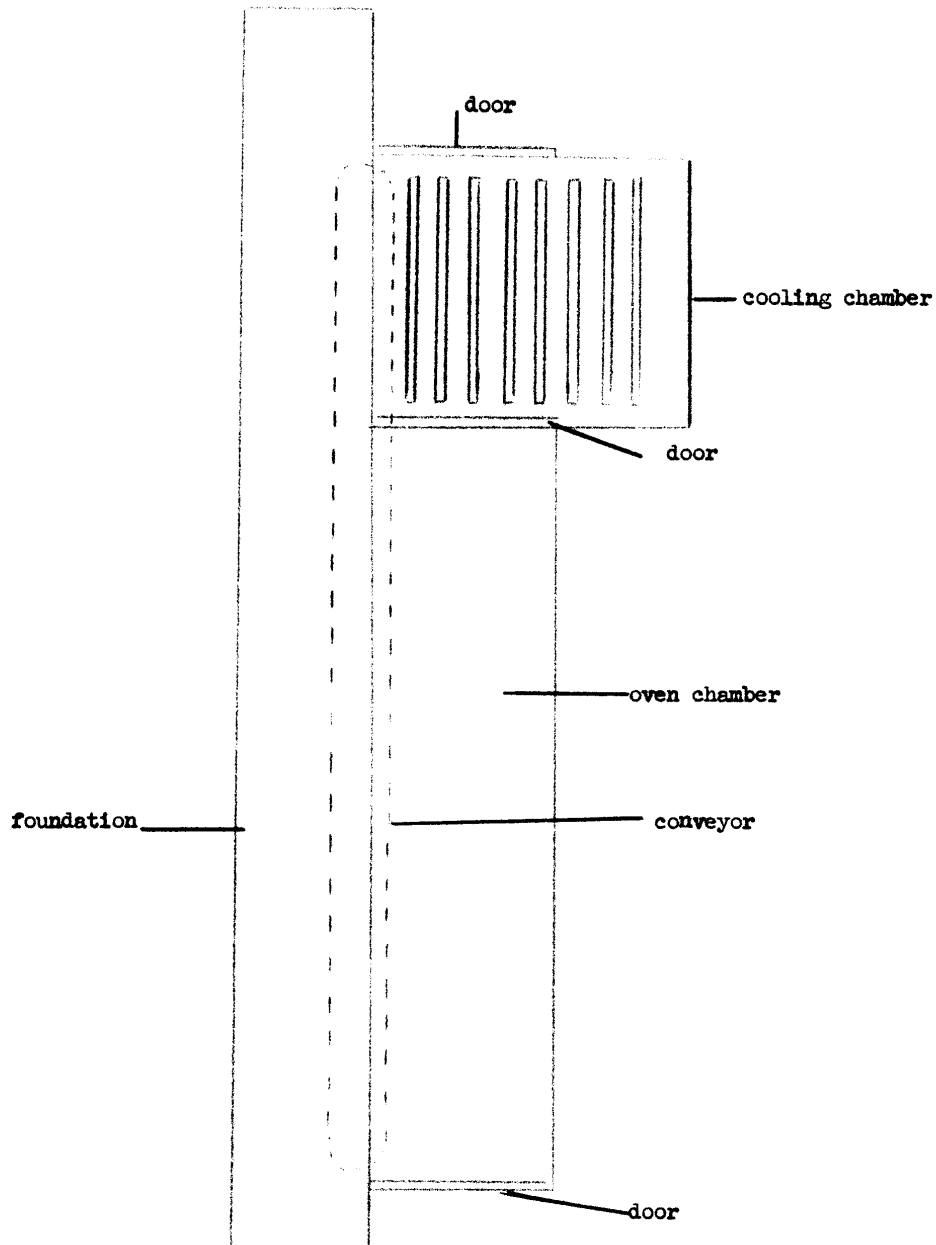
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Sketch of Electric Oven,
Shop No 12, Plant No. 45, Moscow

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Figure 1 - Casing (Kozhukh)

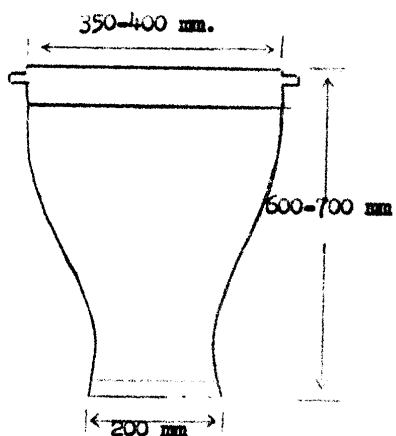


Figure 2 - Combustion Chamber

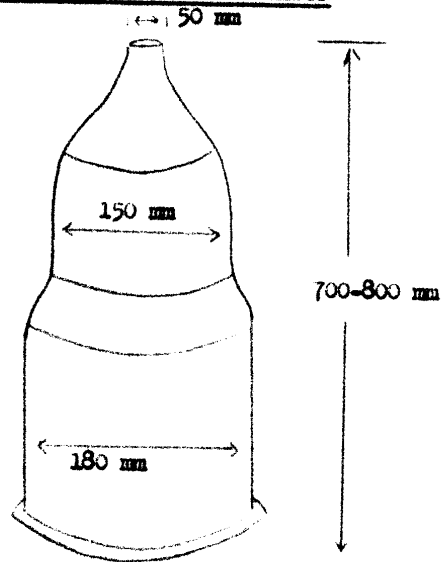
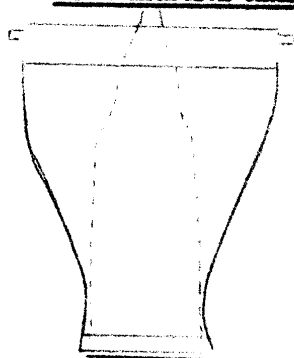


Figure 3 - Assembled Casing
and Combustion Chamber



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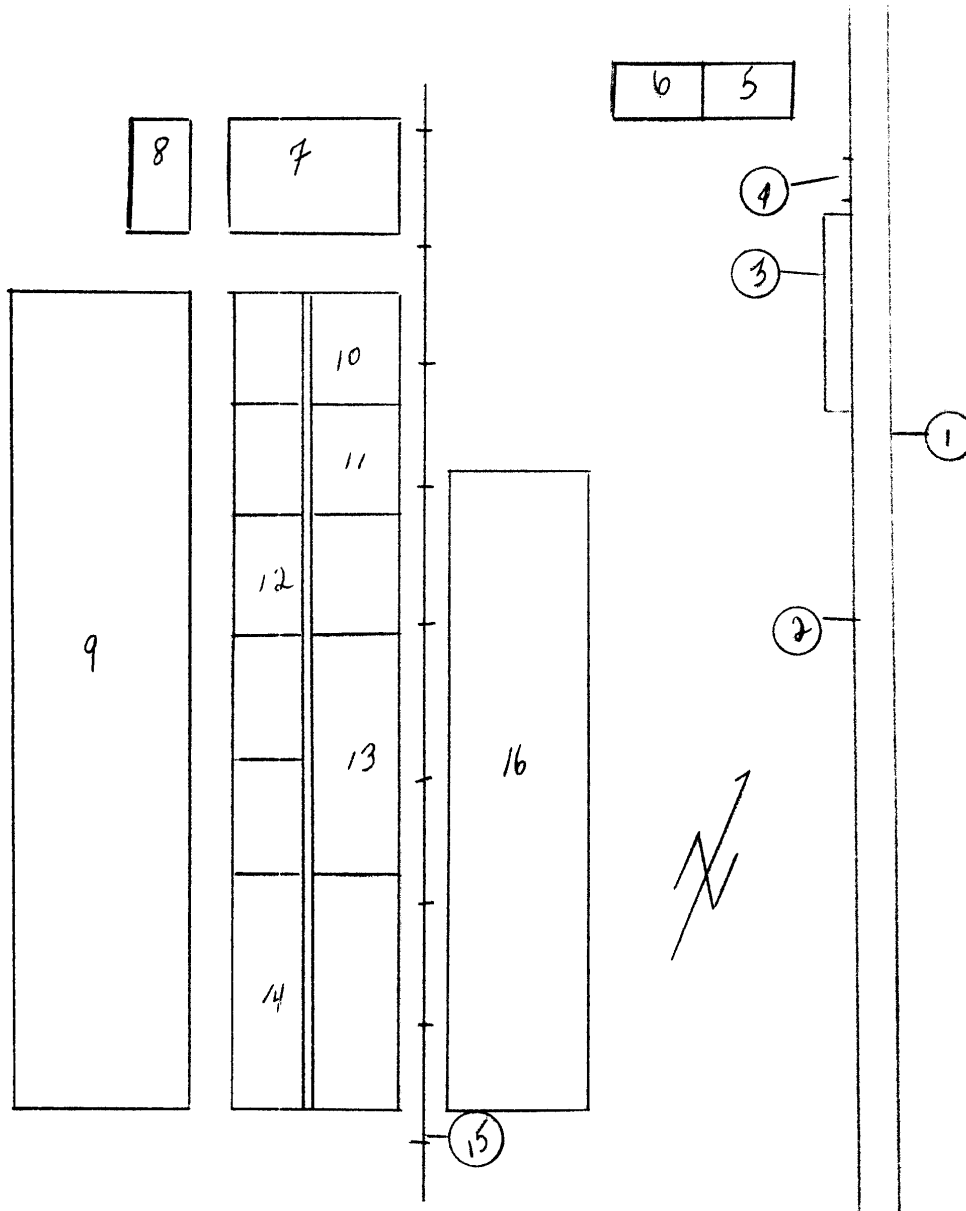
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Sketch of Abbreviated Layout of the Northeast
Corner of Aircraft Engine Plant 45, Moscow (not to scale)

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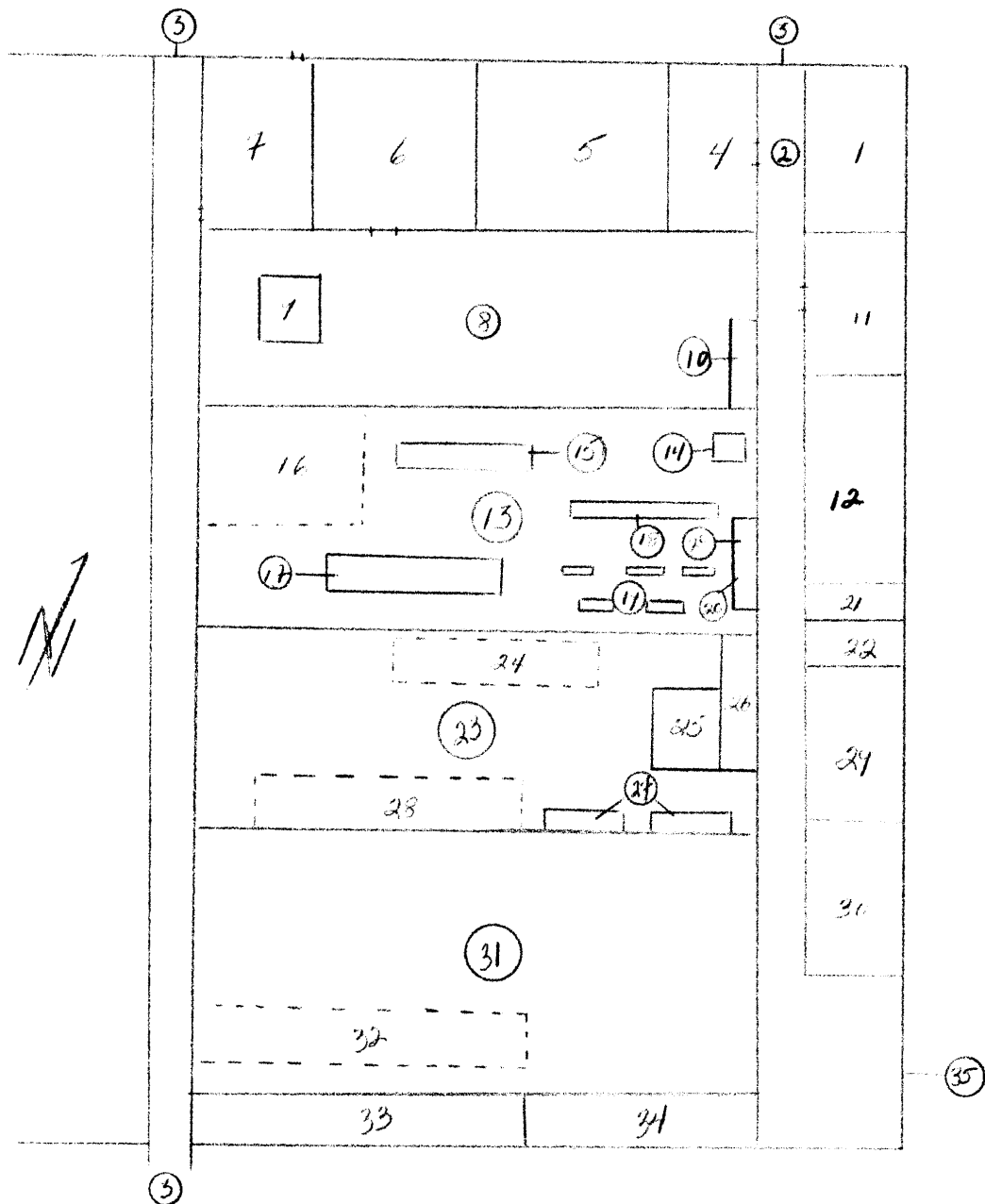


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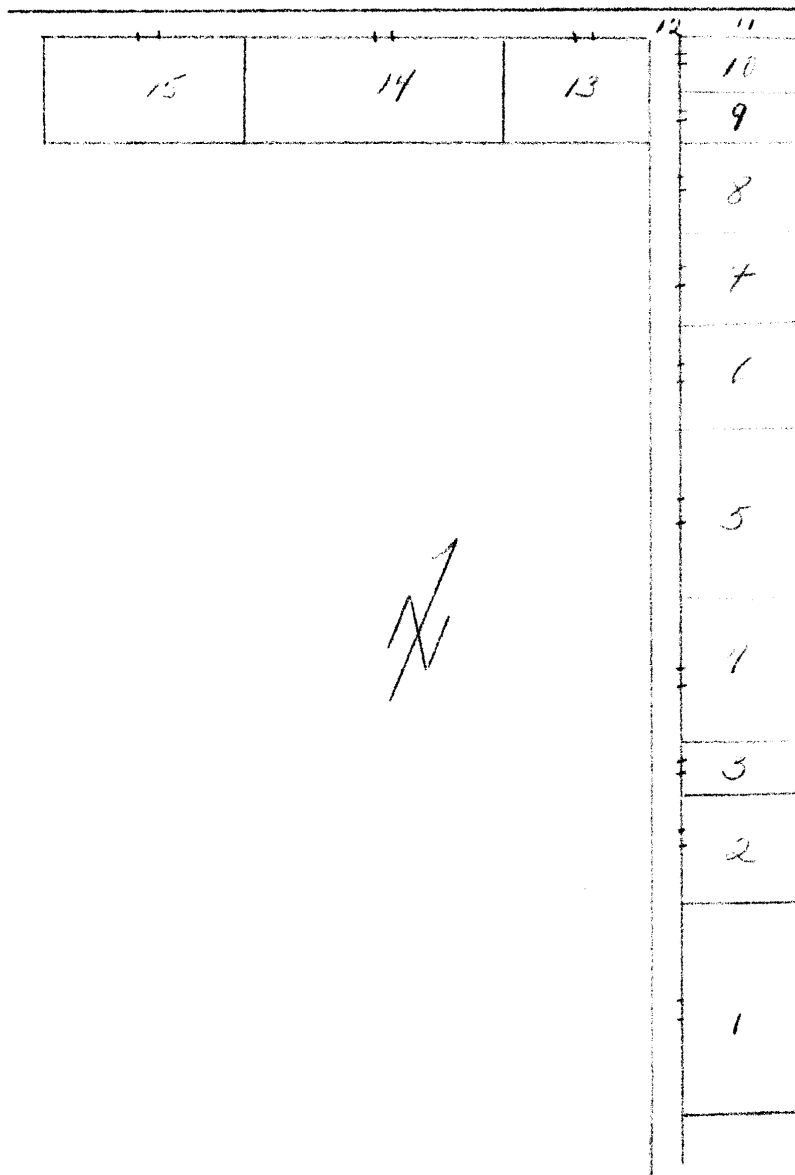
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Sketch of Layout of Second Floor, Shop No. 12
Aircraft Engine Plant No. 45, Moscow (not to scale)

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